ABSTRACT OF THE DISCLOSURE

A method of forming a top oxide layer of a SONOS-type nonvolatile storage device is disclosed. According to a first embodiment, a method may include forming an in situ steam generation (ISSG) top oxide layer **208** from a charge storing dielectric layer **206** by reacting hydrogen and oxygen on a wafer surface (step **102**) and depositing a conductive gate layer **210** (step **104**). An ISSG top oxide layer **208** may be of higher quality and formed with a smaller thermal budget than conventional approaches.